



DARK ENERGY
SURVEY

Commissioning



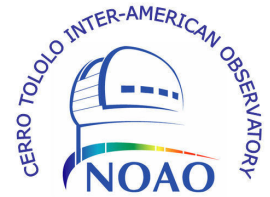
Alistair Walker

NOAO/CTIO



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When?

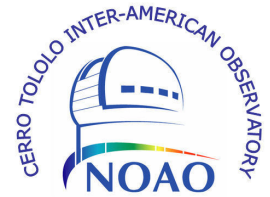


- After (most of) the integration & installation is done
- Including science verification, October 2011 – January 2012
- This is only one year away!!
- 2011B semester. Announcement to community on March 1 2011, Proposals due March 31, TAC meets early May, scheduling finalized early June.



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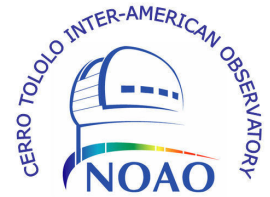
Commissioning – top level



- Largely a science driven activity – an integrated program to verify that DECam is ready for DES science and for use by the NOAO community
- The aim will be, as much as possible, to test the Blanco Telescope and DECam as *a system* to identify unreliability, latencies, inefficiencies, interface problems, software bugs, etc.
- We need to:
 - Test DECam and the Community Pipeline
 - Test the DESDM system and the science analysis modules
 - Verify the operation of the Data Transport System and check there are no network or firewall issues
- Documentation:
 - DES Projects Requirements Acceptance Testing (DES-doc 4304)
 - DES Projects Requirements Acceptance Testing Matrix (DES-doc 3533)
 - DES Science Acceptance Test Plan (due 3/2011)
 - DECam System Commissioning Plan (DES-doc 3734, last updated June 11 2010)



Commissioning top level - II



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- Performance
 - Verify that installation on the telescope has not degraded DECam's performance
 - Evaluate optical performance of telescope + corrector + filters
 - Test and calibrate telescope-camera controllable systems (focusing, alignment, guiding)
 - Collect astronomical and calibration data that will allow testing of the two pipelines
- And keeping it that way...
 - Check stability of DECam performance
 - Test the robustness (fault tolerance) of everything
 - Determine operational efficiency
- And learning
 - Practice procedures such as filter changing, F/8 changing, calibration procedures – often these will be daytime activities
 - Conduct operations training, complete documentation
 - Evaluate safety
- And transitioning to science
 - Undertake science analyses with real data



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Strategy



- The Imager/FEE and the Optical Corrector will be the last parts of DECam to arrive at CTIO. All the earlier-arriving parts should have been tested and the off-telescope installations completed by the time they arrive.
- The Imager will then be verified to have arrived undamaged and be functional. Additionally, we will verify that the Optical Corrector is undamaged and is lined-up.
- We can complete the PF cage installation and begin commissioning while further Imager testing on the floor is still underway.
- **Part 1** - F/8 mirror optical alignment – this requires the cage only, in principle
- **Part 2**- Install C5 onto the imager counterweight and test the optics with SBIG cameras/ wave-front sensors
- **Part 3** Install the Imager and FEE crates, then full system tests



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Commissioning Schedule

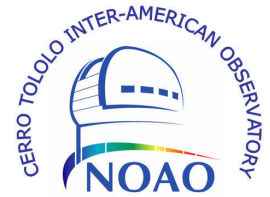


October 20, 2010

DOE-NSF REVIEW June 22 2010



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Part I – test F/8

- Pre-requisites
 - The cage will have been positioned in x,y,z and tilt during installation (DES-doc 3800)
 - The Imager counterweight and the F/8 counterweight will be installed
 - The operation of the F/8 handler will have been verified
 - The F/8 control system will be the same as pre-DECam
 - ISPI and IMAN installed at F/8
- Commissioning Tasks
 - Removal of counterweight & installation of F/8
 - Verify correction operation of F/8 focus and tilt control
 - Analyze optical performance with IMAN, do a sky map and build LUT
 - Remove F/8 mirror partially, restore, repeat above
 - Confirm performance by using ISPI
 - Remove F/8 mirror and replace counterweight (scheduled time could be inserted here)
- Time
 - 7 nights



Part II – Test DECam Optics



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- Pre-requisites
 - Phase I completed
 - Corrector (all of C1-C5) installed, DECam filters installed, shutter installed (?), SBIG camera system installed, hexapods functional, SISPI control
- Tools
 - PF Shack Hartmann WFS
 - PF Hartmann Screen
 - BCams
 - SBIG cameras, Shack Hartmann lenslets
 - Software tools



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Part II Continued

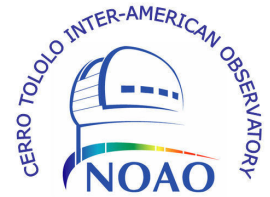


- Basic tests with the telescope at zenith
 - Focus, is it where expected?
 - Establish collimation
 - Use radial cameras to establish tilt, set hexapod suitably
 - Evaluate image quality at zenith. Do the filters seem OK?
- Tests at a variety of sky positions
 - Evaluate image quality over the sky, build a LUT for top end deflections (with BCams, may have done this as part of installation)
 - Focus as a function of sky position, temperature, filter
 - Check LUT for the primary mirror active optics
 - Correlate with DIMM, ECS sensors etc



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Part II continued

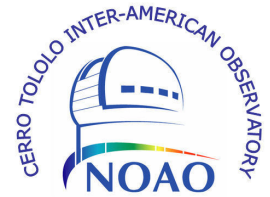


- Time
 - basic tests – 3 nights
 - multiple sky position tests – 5 nights
- Afterwards;
 - Remove SBIG cameras
 - Remove C5
- Then, options
 - Reinstall F/8 mirror and observe with a block of F8
 - Other Imager pre-installation activities



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Part III

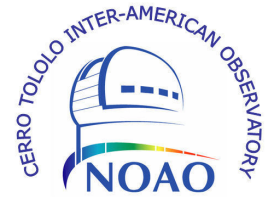


- Pre-requisites
 - DECam Imager installed and has passed its functional tests
 - Everything is talking & listening...
- Activities can be grouped into
 - Engineering/monitoring activities
 - Daytime calibrations and exercising SISPI
 - Night time activities
 - Evaluation
- Night time activities
 - Image quality (getting it, and keeping it)
 - Guiding, short slews
 - Photometry and astrometry
 - Does everything play together? Efficiently?



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Keeping it Altogether



- Team & tasks
 - Night Crew – runs the night time tests. *Not too many people in the control room!!!!*
 - Day Crew – Responds to night time problems and runs any day time tests, takes calibrations.
 - Remote Crew – La Serena, Urbana-Champagne, Tucson, Fermilab, DES Institutes: run pipelines, science teams look at data, provide specialist support as and when needed by phone, video, net
 - The on-site team will be made up from DECam Project people and CTIO staff.
- Wiki, observing log book
- JIRA
- Strict control of software versions
- Daily planning meetings in the late afternoon (30 min)
- Flexibility – things WILL not go entirely to plan



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Immediate Post-Commissioning



- Community science verification time
 - How it works
 - Two several night programs from experienced teams, selected by special TAC
 - Chosen for both science impact and for exercising the equipment
 - The teams sign up for rapid data reduction and publication
 - Proprietary time set to zero to encourage this!
 - Why?
 - Allows community to access real DECam data early, to help them plan their own programs
 - This model was very successful with NEWFIRM
- DES verification time
 - Do a mini-survey using DES protocols



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What's Next?



- We will specify engineering and science support through commissioning-verification-operations, and plan for “reality” rather than optimistic scenarios
- We will incorporate the DES Science Acceptance Test Plan as soon as it is available
- We will update the DECam System Commissioning Plan as the simulator and integration tests proceed, as calibration plans evolve, etc.
- The schedule for integration -> installation -> commissioning -> Science verification will be developed in detail over the next 12 6 month
 - *(Integration/Installation meeting in La Serena, early March 2011*
 - *DOE-NSF Operations Review in May 2011(?)*



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The End





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NOAO Goldberg Fellowship



- Fellowship at NOAO (**Chile** or Tucson)
 - Encourage participation in long-term projects
 - Encourage participation in ongoing NOAO activities,
 - DES/DECam,
 - Other new Blanco instrumentats (COSMOS, TripleSpec)
 - LSST
- Term: 5 years
 - 4 years at either NOAO site (or both)
 - 1 year at any U.S. institution of choice